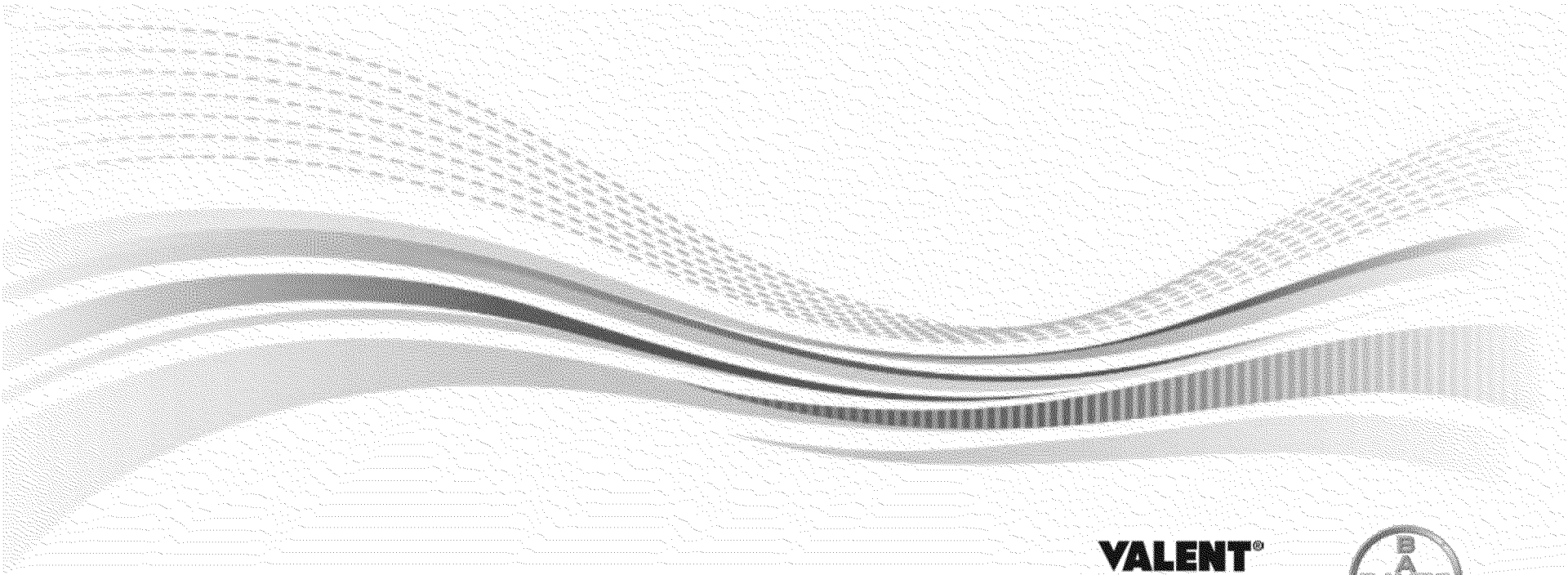
Four cucurbit study – review of results and proposal for 2016 trials



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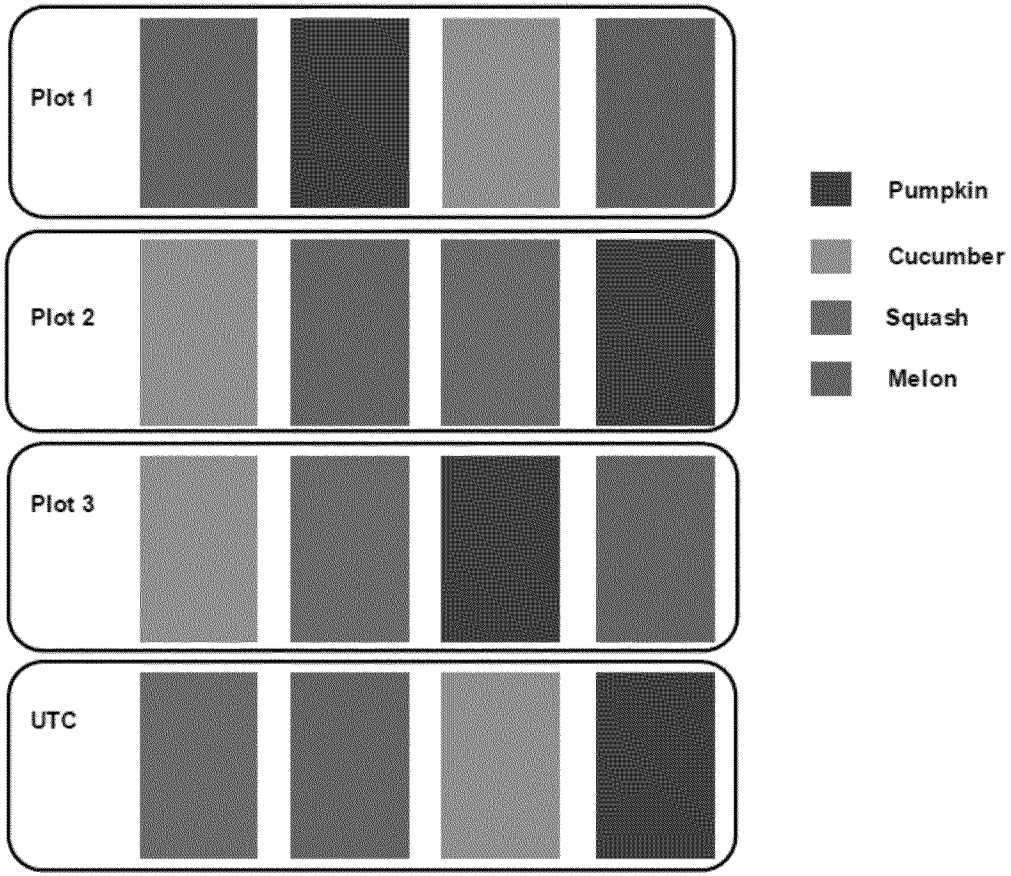
Four Cucurbit Study Design

- Valent Study conducted in 2015
- 1 location:
  - Fresno, California (Sandy loam, 0.8% OM)
- Test substance: Belay® Insecticide
- Soil Application by Chemigation at Planting (0.2 lb a.i./A; 224 g a.i./ha)
- Three replicate plots per crop plus UTC
  - Nectar, pollen and leaves collected by hand
- Proposed as an alternative to EPA DCI to determine residues of clothianidin in pollen and nectar of winter squash, summer squash, melon and cucumber

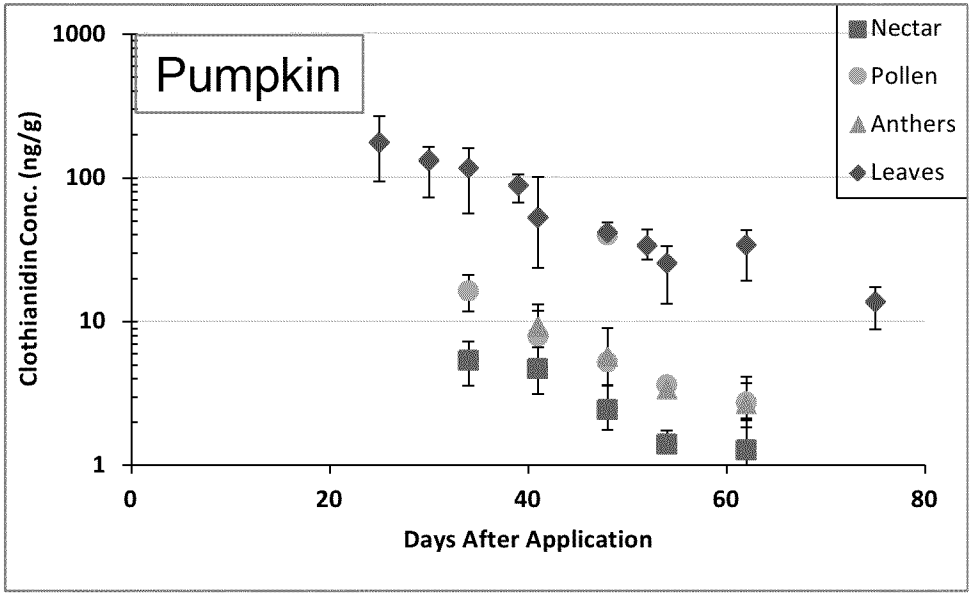
Four Cucurbit Study Design

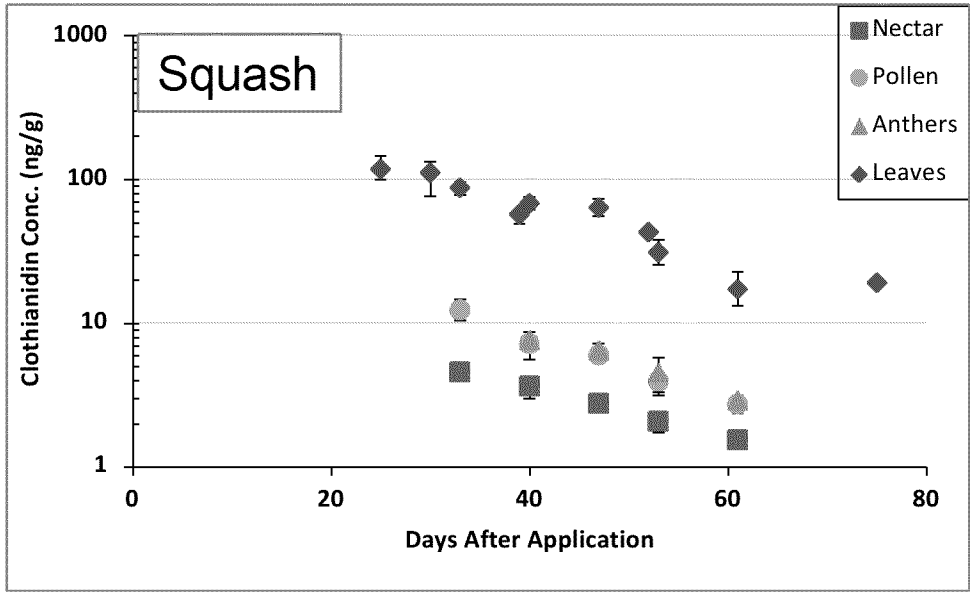
- Study designed to answer the null hypothesis:
  There are no differences in the residues of a neonicotinoid insecticide in nectar and pollen of different species of cucurbits following application of the product to soil."



Results: Pumpkin and Squash

- Residue profile of clothianidin in pumpkin and squash almost identical
  - Leaf residues higher than anthers
  - Anther and Pollen residues very similar
  - Nectar residues all less than 7.5 ppb
  - Residues in all matrices decline with time after planting
- No significant differences between residues in the two species
- Data demonstrate that pumpkin is a good surrogate for squash
- Respectfully request a waiver for studies at multiple sites in squash

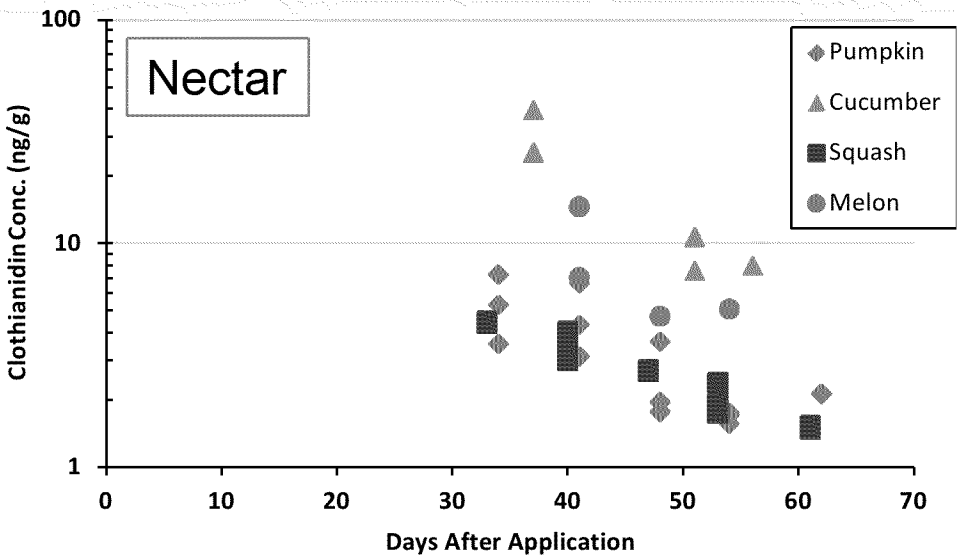


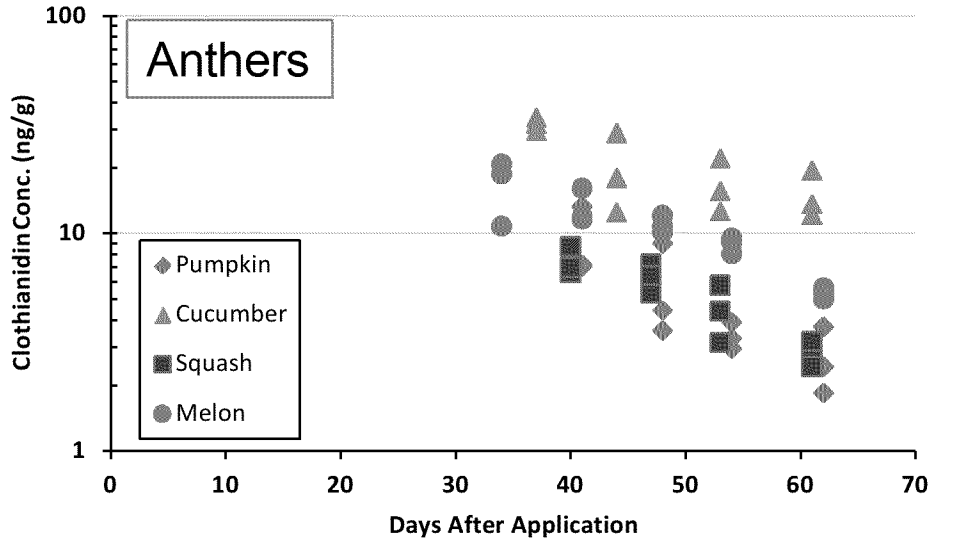


Results: Melon and Cucumber

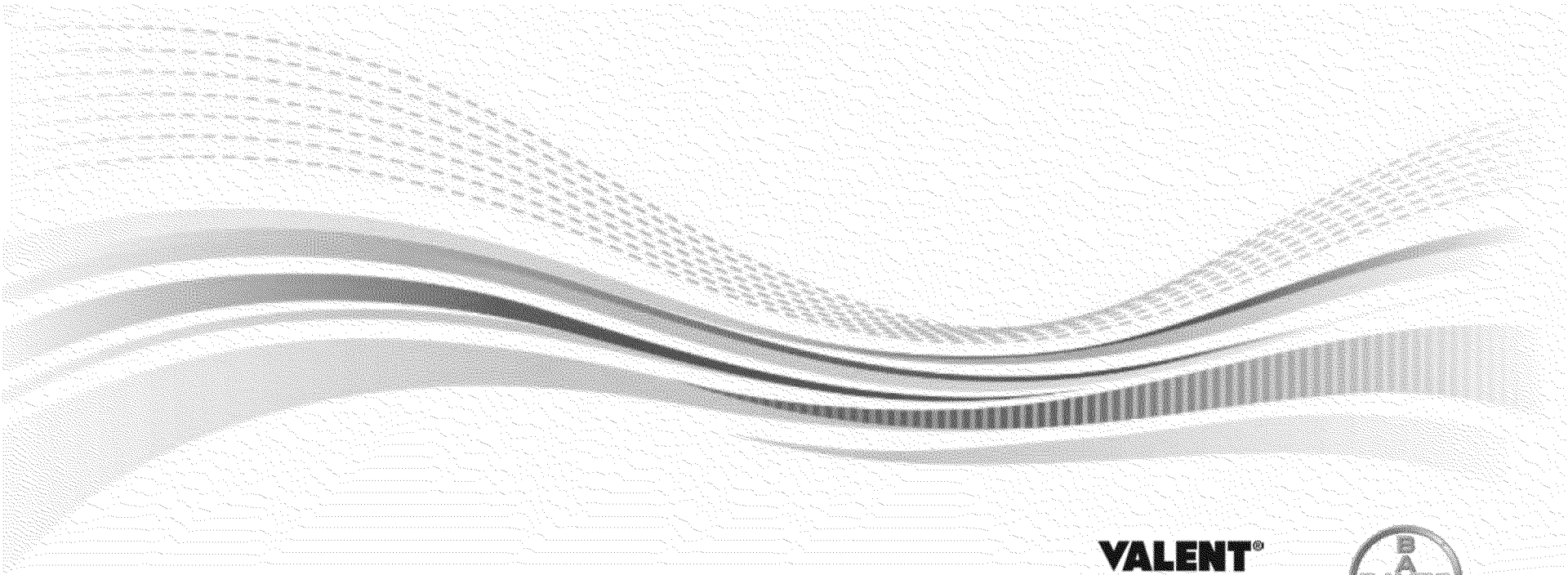
- Very difficult to collect nectar from cucumber and melon by hand in CA
- No pollen was collected for cucumber and melon
- Residues of clothianidin nectar, anthers and leaves were highest in cucumber

- Therefore we propose to conduct studies in cucumber in 2016
  - Three locations
  - Use bees as collectors of nectar (and pollen if possible)
  - Collect nectar from honey stomachs and pollen from bodies or pollen traps
- We respectfully request a waiver for studies in melon as cucumber will be a worst-case surrogate based on 2015 data





Quantitation of Clothianidin Residues in Nectar and Flowers Following Seed Treatment Application to Soybean



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Soybean Study Design

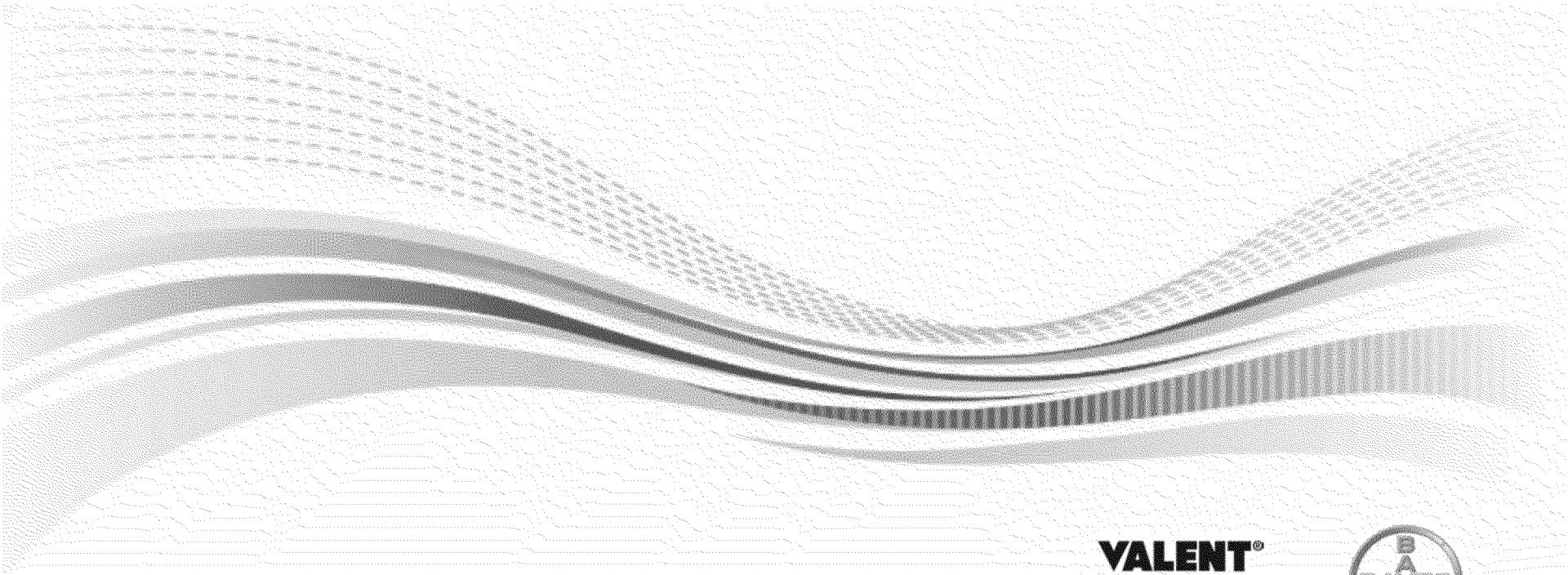
- BCS Study (MRID 49803701) conducted in 2012
- 3 locations:
  - North Carolina (Sandy Loam, 1.5% OM)
  - Georgia (Sand, 0.9% OM)
  - California (Silt Loam, 1.4% OM)
- Test substance: Poncho®/VOTiVO®
- Seed treatment: 0.13 mg clothianidin/seed (56 to 71 g ai/ha)
- Two replicate plots per location
  - Flowers collected by hand
  - Nectar collected from a previously empty frame with drawn comb within the hive 0 -1 day after flower collection using tented bees.

Residues in Soybean Flowers and Nectar in 2012

Matrix	Days After Planting	NC Sandy Loam	GA Sand	CA Silt Loam
Flowers	56-71	<LOD	<LOD	<LOD
Nectar from hive	57-71	<LOD	<LOD	<LOD

LOD for flowers: 0.63 ppb
LOD for nectar: 0.08 ppb

Quantitation of Clothianidin Residues in Nectar, Pollen and Leaves Following Seed Treatment and Foliar Applications to Cotton



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Cotton Study Design

- BCS Study conducted in 2015
- 3 locations:
  - Missouri (Loamy Sand, 1.1% OM)
  - Texas (Sandy Clay Loam, 1.4% OM)
  - California (Loamy Sand, 0.3% OM)
- Test substances
  - Seed treatment: Poncho®/VOTiVO®
  - Foliar: Belay® Insecticide
- Treatments
  - TRTD1: Seed treatment: 0.353 mg ai/seed (51 g ai/ha @ 58,000 seeds/A)
  - TRTD2: Foliar treatment: 0.083 lb ai/A (93 g ai/ha) @ Candle Growth Stage (5-7 days before flowering)
  - TRTD3: Seed treatment + Foliar treatment : 0.353 mg ai/seed + 93 g ai/ha @ Candle Growth Stage (5-7 days before flowering)
- Three replicate plots per treatment plus 1 UTC
  - Floral nectar, extrafloral nectar, pollen and leaves collected by hand
  - Nectar collected from previously empty frame with drawn comb from hives of tented bees at CA location, UTC & TRTD3

Results: Seed Treatment

- Clothianidin residues below level of concern
- Residues in floral nectar < 0.2 ppb
- Residues in extrafloral nectar <0.2 – 3.84 ppb (possibly drift from foliar applications)
- Residues in pollen <0.2-4.57 ppb

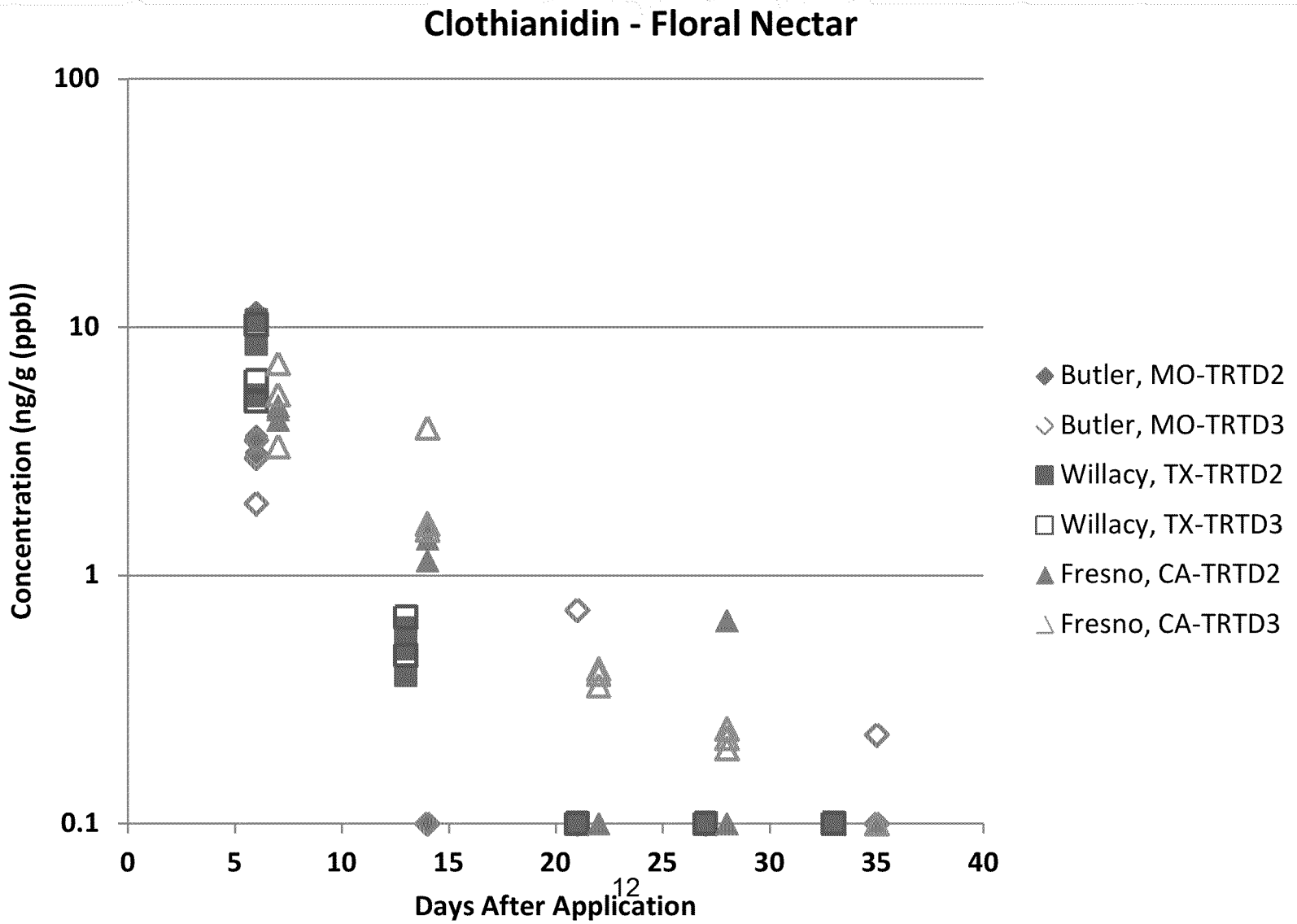
Location	Butler, MO		
Treatment	UTC		
Analyte(s)	Clothianidin		
Matrix	Floral Nectar	Extrafloral nectar	Pollen
Date	ppb	ppb	ppb
8/18/15	<LOD	3.89	<LOD
8/31/15	<LOD	1.01	<LOD
9/16/15	<LOD	<LOD	<LOD

Location	Butler, MO		
Treatment	Seed treatment, planted on 5/28/15		
Analyte(s)	Clothianidin		
Matrix	Floral Nectar	Extrafloral nectar	Pollen
Date	ppb	ppb	ppb
8/18/15	<LOD	0.53-3.84	<LOD-0.43
8/31/15	<LOD	<LOD-0.52	<LOD-0.41
9/16/15	<LOD	<LOD	<LOD-1.04

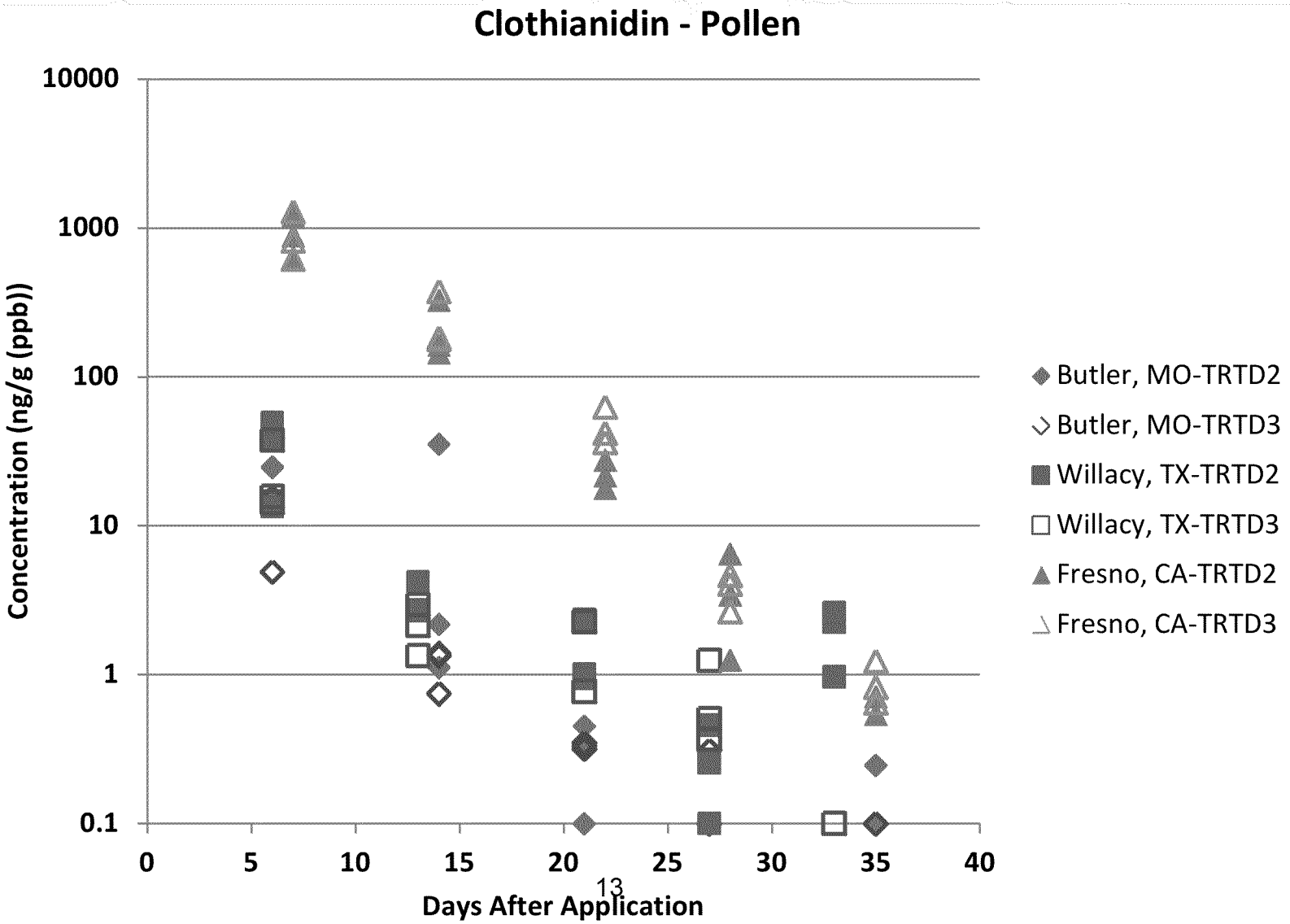
Location	Fresno, CA		
Treatment	Seed Treatment, planted on 4/17/15		
Analyte(s)	Clothianidin		
Matrix	Floral Nectar	Extrafloral nectar	Pollen
Date	ppb	ppb	ppb
7/9/15	<LOD	NS	0.92-4.57
7/21/15	<LOD	<LOD	<LOD-0.43
8/6/15	<LOD	<LOD	<LOD-0.30

Location	Willacy, TX		
Treatment	Seed treatment, planted on 5/5/15		
Analyte(s)	Clothianidin		
Matrix	Floral Nectar	Extrafloral nectar	Pollen
Date	ppb	ppb	ppb
7/22/15	<LOD	1.60-2.32	<LOD-0.37
8/3/15	<LOD	0.22-0.49	0.51-1.82
8/15/15	<LOD	0.26-0.36	<LOD

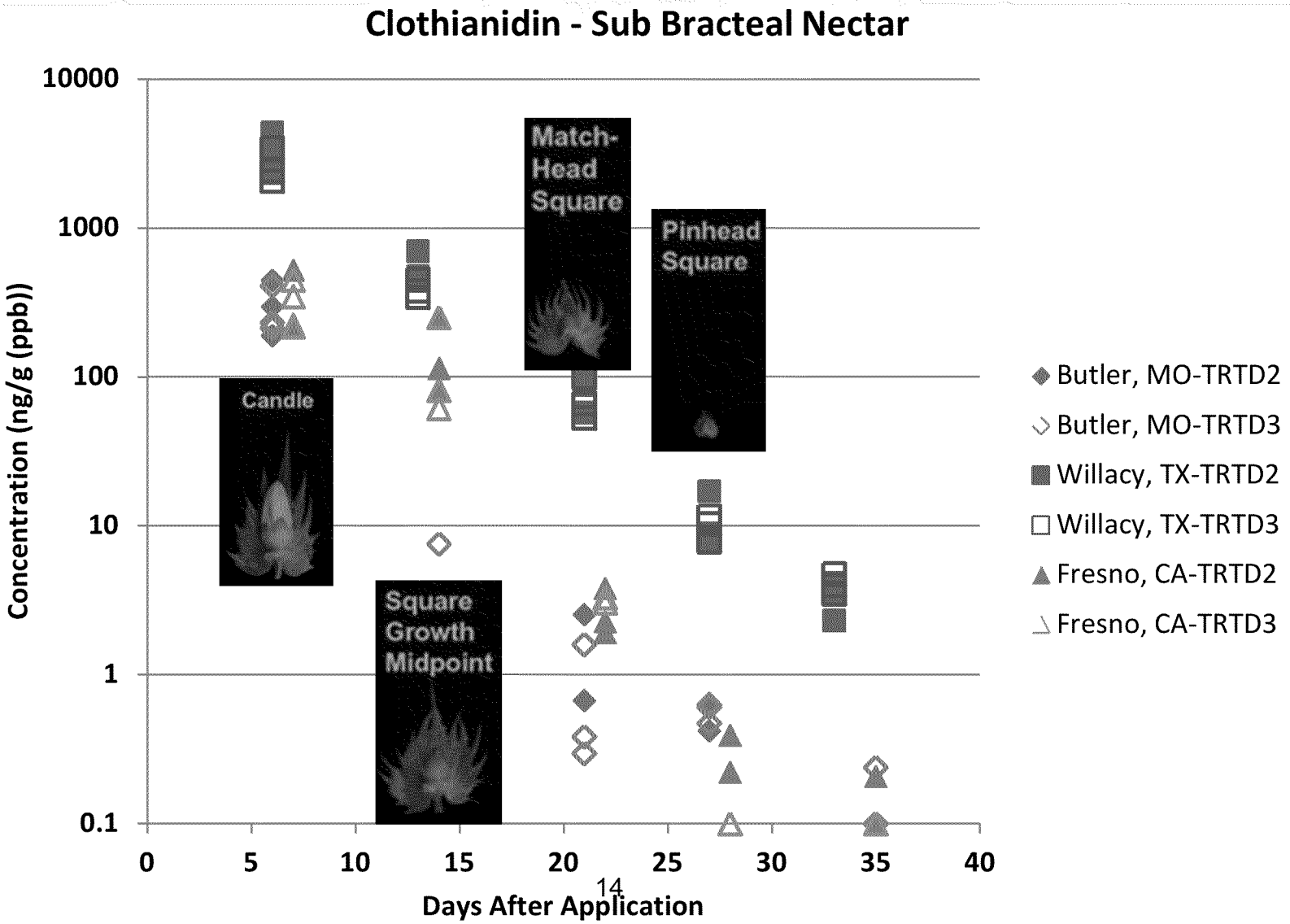
Results: Foliar and Foliar + Seed Treatment



Results: Foliar and Foliar + Seed Treatment



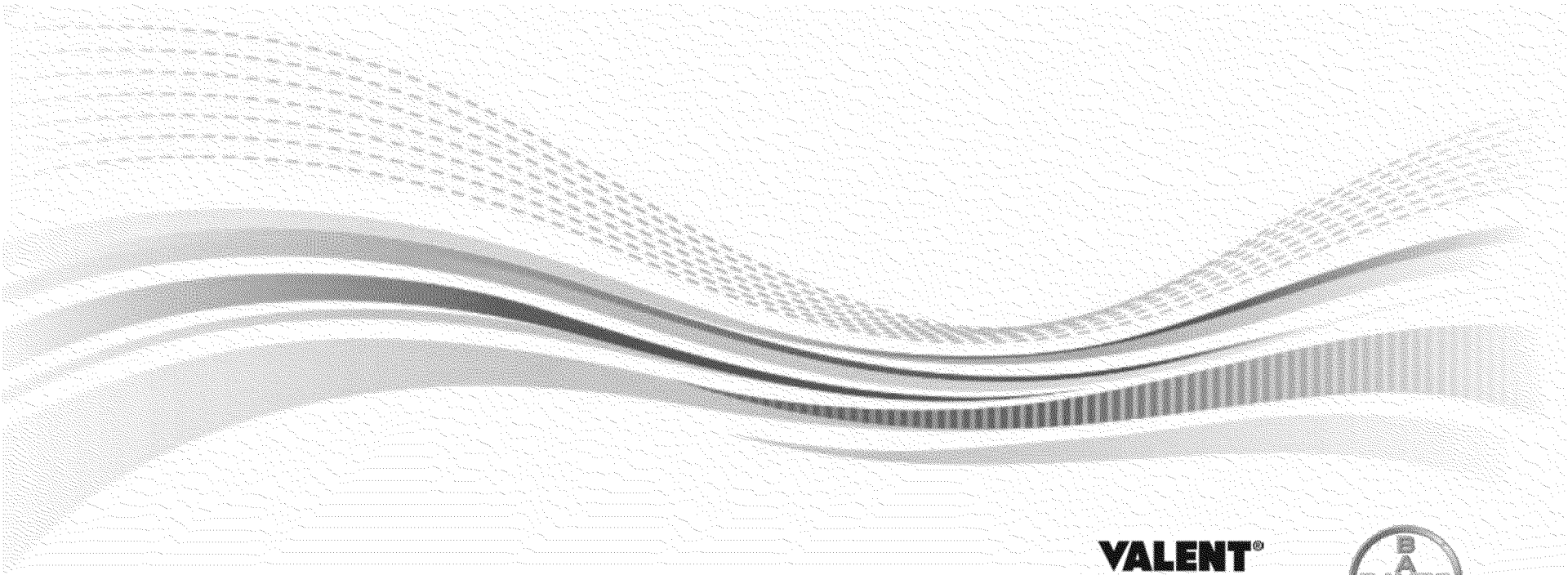
Results: Foliar and Foliar + Seed Treatment



Summary

- Residues in floral nectar, pollen and extrafloral nectar are negligible and below of levels of concern for seed treatment use pattern
- Residues in extrafloral nectar when foliar applications are made at candle growth stage are above levels of concern.
  - Further mitigation options will be evaluated in consultation with stakeholders.

Quantitation of Clothianidin Residues in Pollen and Leaves Following In-Furrow and Foliar Applications to Potato



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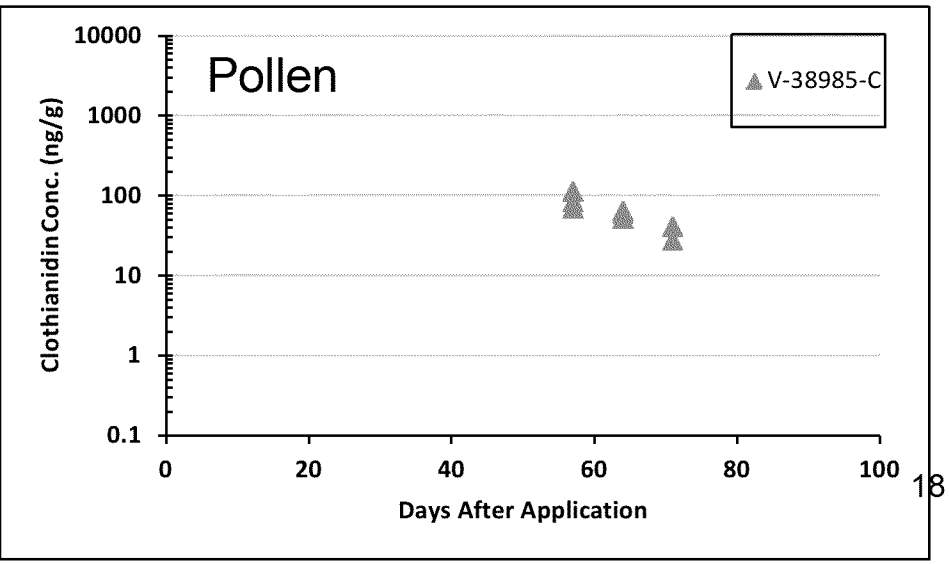
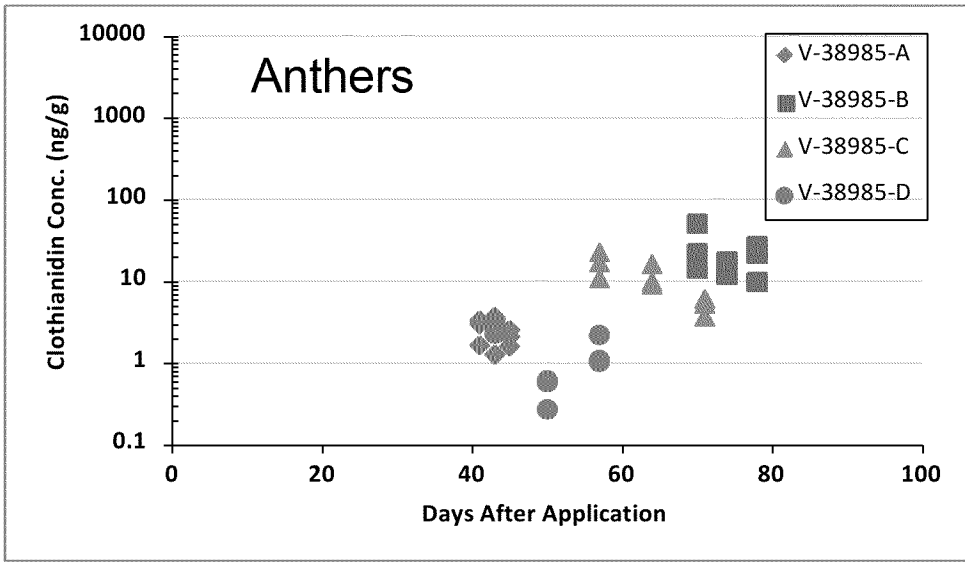
Potato Study Design

- Valent Study conducted in 2015
- 4 locations:
  - Northwood, ND (Sandy Loam, 2.5% OM)
  - Fresno, CA (Sandy Loam, 0.9% OM)
  - Hermiston, OR (Loamy San, 0.8% OM)
  - Oregon City, OR (Loam, 3.7% OM)
- Test substances
  - Belay® Insecticide
- Treatments
  - TRTD2: In-Furrow at Planting - 0.2 lb a.i./A (224 g a.i./ha)
  - TRTD3: Foliar Application at 50% row closure (BBCH 31-59) and avoided 5-7 days before bloom and petal fall – 0.05 lb a.i./A (56 g a.i./ha)
- Three replicate plots per treatment plus 1 UTC
  - Pollen and leaves collected by hand

Results: Soil Application

- Limited number of pollen samples were collected
- Anthers not a good surrogate for pollen following soil application in potatoes. Residues in anthers ca. 5 to 8 x lower than pollen.
- Highest residues observed at early bloom
- Highest residues in anthers and leaves observed in coarse soils with low organic matter content
- Clothianidin pollen residues:
  - Maximum: 188 ppb
  - Average: 92.6 ppb





Results: Foliar Application

- Anthers not a good surrogate for pollen following foliar application in potatoes. Residues in anthers ca. 3 to 9 x lower than pollen
- Highest residues observed at early bloom
- Highest residues in anthers and leaves observed in coarse soils with low organic matter content
- Residues lower than following soil application (application rate = 25% of soil application)
- Clothianidin pollen residues:
  - Maximum: 116 ppb
  - Average: 76.1 ppb